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THE FOREST FLORA OF GRASSY SPRAIN RIDGE

BY G. T. HASTINGS

In walking through the woods in parts of Westchester County just above New York City the impression was gained that a new type of forest flora is developing there. To test the accuracy of this, and at the same time to see if any correlation could be made between the herbaceous vegetation and particular species of trees, a study was made of the plants on the top and upper slopes of Grassy Sprain Ridge. In the study the adaptation of the quadrat method suggested by Dr. H. A. Gleason* was followed. One meter quadrats were taken every twenty-five paces on lines along the top and slopes of the ridge. On the quadrat each species of herb and shrubs was listed and notes made of the surroundings. All the trees within two meters of the line were counted.

Grassy Sprain Ridge is one of several ridges parallel to the Hudson Valley in Westchester County. These ridges were all originally forested, have all been partially cut over and have generally gone back to forest condition. The ridge is about two and a half miles long, about a half mile broad and is cut across by a swampy area. There are several rocky knobs along both parts of the ridge and a little level land on parts of the summit. The soil is rocky, with frequent outcrops of gneissic rocks, and is nowhere deep or rich except in a few swampy hollows. A small part of the land was formerly cleared, but at present only a very small area is pastured, and none is or has recently been cultivated.

Forty-one species of trees were listed, this including several small forms—*Cornus florida*, *Carpinus*, *Ostrya*, *Hamamelis*, *Rhus*, *Sassafras*, and *Viburnum prunifolium*, two cultivated trees that have grown wild, and one that is practically extinct, *Castanea*, and

* Bulletin of the Torrey Botanical Club, 47: 21-33, Feb. 1920.

several others that will disappear as the forest develops—*Ailanthus*, *Robinia*, *Populus grandidentata*, *Betula populifolia* and *Juniperus*. Excluding these, the forest trees that can be expected to persist and make up the final forest number but twenty-six. Apple trees are frequent and in one place in an old meadow have grown up into a veritable orchard of scrubby trees. Cherry trees, *Prunus Cerasus*, are scattered through the woods, usually in rather open places, but a few are in close growths of oak and birch and have assumed a typical forest form, tall and straight with clear trunks for at least twenty-five feet. There are also many young cherries growing up in thickets of *Viburnum* and among the oaks. Over all the ridge there have been frequent fires that check the growth of young trees, but in spite of this there were tree shoots—oak, hickory, ash, maple and elm—on over half of the quadrats, all old enough to have survived at least one fire, and on half as many more there were seedlings of one or two years that had not been subjected to fire.

In all 1,857 trees were counted, 37 per cent. of the total being oaks. Of these *Quercus velutina* was most abundant and made 13.4 per cent. of the total, *Cornus florida*—11, *Quercus prinus*—9.7, *Q. alba*—9.5, *Acer saccharum*—6.4, *Betula lenta*—6.2, *Hicoria glabra*—6.2, *Robinia Pseudo-acacia*—5.7, and *Fraxinus Americana*—4. If the trees that are not of forest type are excluded, the oaks would form over 50 per cent. of the total. The dominant tree in most parts of the ridge is the black oak, *Quercus velutina*, though some of the drier sections were dominated by the chestnut oak, *Q. prinus*. In a few low spots with deeper soil the sugar maple, *Acer saccharum*, dominated, and in the same localities were found most of the tulip trees, basswood, beech and hemlock. Practically all of the locusts were in spots previously cut clean for pasture or cultivation. With the locusts grew all of the pin oak, swamp-white oak, walnut, staghorn sumach and apple, and half of the sassafras, elm, gray birch and sour cherry. But one tree each of *Ailanthus*, *Celtis*, *Populus grandidentata*, *P. tremuloides* and *Quercus stellata* was found, and but two each of walnut and hemlock. Those of which but one specimen was found were

probably accidental entrants, the hemlock and walnut relicts of former more abundant growth. The chestnuts were all dead trunks with young root shoots. Other chestnuts had been cut in recent years, as witnessed by the stumps, so that the 62 dead trees (making 3.6 per cent. of the total) is only about half the number that would have been found before the chestnut canker wrought havoc among them. The young shoots are the heroic effort of the dying trees to hold their place in the forest, but are, of course, of no importance to the future of the forest. Evidently the climax forest will differ from the one it succeeds chiefly in the loss of the chestnuts, walnut and hemlock and in the addition of sour cherry, hackberry and ailanthus. The apple trees, while holding their own with the younger growth, show no sign of being able to persist in a denser and larger forest growth. The locust, sumach, aspens and gray birch are pioneer trees that will later give way. Judging of the future composition of the forest by the young growth, ash will become relatively more important than at present, as there were more of both seedlings and shoots than of any other tree. Hickory, white and black oak, black birch and sugar maple all have frequent shoots and less frequent seedlings, and even with the frequent ground fires will be at least as important in the future as at present. If fires could be prevented dense forest would soon develop. Tulip trees seem to be more sensitive to fire than others, for while seedlings of one season were common older ones or root shoots were entirely absent.

No definite correlation could be made between the shrubby and herbaceous vegetation and the trees. Chestnut oaks, which dominated certain parts of the ridge, had associated with them laurel, azalea and Vacciniums, none of which grew with the black oaks. Under the same trees, too, *Helianthus divaricatus* and *Anychia canadensis* had their greatest frequency indices. Black oak, the most abundant tree, and for large areas the dominant one, had no plants especially associated with it, though the most abundant plant of the region, *Falcata comosa*, had its highest frequency index under these trees, as did also *Poa compressa* and *Potentilla canadensis*. With sugar maple in the damper soil grew all the

Asarum, *Bromus ciliatus* and *Impatiens*, and the largest proportion of *Anemonella*, *Antennaria*, *Arisaema*, *Aster divaricatus*, *Polystichum* and *Adiantum*. With the locust trees grew plants characteristic of the open rather than of the woods; in fact, no forest plants at all were found except one plant of *Aquilegia* and one of *Botrychium virginianum*.

It is evident that the climax forest that will develop if allowed to will differ but slightly from the original forest of the region. This difference will be due to the loss of a few species, especially chestnut and hemlock, and the possible addition of a few new species, such as sour cherry and ailanthus, which will never make a large proportion of the trees. There will also be a greater proportion of black oak and white ash. The vegetation below the trees will show more change, as some introduced plants characteristic of open places are so well established in parts of the forest with shallow soil and somewhat xerophytic conditions that they may be considered a permanent part of the forest. Among such plants are *Potentilla canadensis*, *Poa compressa*, *Oxalis stricta*, *Fragaria virginiana*, *Ambrosia artemisiaefolia* and *Rubus occidentalis*.

SOME INTRODUCED PLANTS OF UTAH

BY A. O. GARRETT

The following paper is supplementary to one entitled "Some Introduced Plants of Salt Lake County," published in the October, 1919, number of *TORREYA*. In that paper sixty-eight species were enumerated as occurring in Salt Lake County. These, together with those here listed, brings the State catalog up to a total of 102 species.

69. *Asparagus officinalis* L. Garden Asparagus. A common escape along streams and irrigation ditches throughout the State.

70. *Rumex Patientia* L. Patience Dock. In Salt Lake and adjacent counties.

71. *Polygonum Convolvulus* L. Black Bindweed. Throughout the State.